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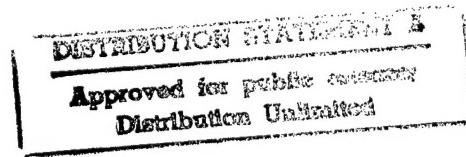
Before the Subcommittee on Space and Aeronautics,
Committee on Science, House of Representatives

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SPACE STATION

Cost Control Problems

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Mr. Chairman and Members of the Subcommittee:

We appreciate this opportunity to discuss the cost control problems of the National Aeronautics and Space Administration's (NASA) Space Station program.¹ Our testimony today will summarize the results of our recent work on this issue and, where available, provide updated information.² Specifically, we will focus on cost growth under the prime contract, the impact on NASA of the Russians' performance problems, and the need to review the program and to consider funding limitations.

Summary

Last year we reported on the deteriorating cost and schedule performance of the space station's prime contractor and identified an emerging risk to the program: the indications of problems in the Russian government's ability to meet its commitment to furnish a Service Module providing the station with power, control, and habitation capability.³ Since then, the prime contract deterioration has continued and the Service Module delay has cost NASA at least several hundreds of millions of dollars, with the potential for costing considerably more should the Russians falter again.

As of June 1997, the station prime contractor—Boeing Defense and Space Group—reported that over 200,000 pounds of its station hardware was being built or had been completed. However, the contract work is costing more and taking longer than planned. For example, in the 17-month period between April 1996 and August 1997, the space station prime contract's cost growth more than quadrupled from \$89 million to \$377 million and the estimated value of the effort required to get the contract work back on schedule increased by more than 50 percent from \$88 million to \$133 million. The cost growth is especially worrisome because the rate of cost deterioration has recently increased. Since the beginning of this year, the monthly cost growth rate has more than doubled—to \$22 million for the 7-month period ending in August 1997 from about \$10 million over the previous 25 months.

¹NASA and its international partners—Japan, Canada, the European Space Agency, and Russia—are building the International Space Station as a permanently orbiting laboratory to conduct materials and life sciences research under nearly weightless conditions.

²Space Station: Cost Control Problems Are Worsening (GAO/NSIAD-97-213, Sept. 16, 1997) and Space Station: Deteriorating Cost and Schedule Performance Under the Prime Contract (GAO/T-NSIAD-97-262, Sept. 18, 1997).

³Space Station: Cost Control Difficulties Continue (GAO/NSIAD-96-135, July 17, 1996) and (GAO/T-NSIAD-96-210, July 24, 1996).

Several months ago, Boeing more than doubled its estimate of the total cost growth at contract completion from \$278 million to \$600 million. More recently, NASA increased its total cost growth estimate to \$817 million. Both NASA and Boeing recognize the seriousness of the cost growth issue and have taken actions to address it. Earlier this year, NASA reduced Boeing's fees because of poor performance. For its part, Boeing has implemented a corrective action plan that it believes will improve the performance of the entire contractor team, and has developed a cost control strategy. The extent to which these efforts will eventually slow the continuing cost deterioration remains to be seen.

The Russians' delay in providing the Service Module has already increased NASA's cost by over \$300 million. Also, additional cost increases related to the effect of this delay on the station's assembly sequence will be seen once NASA resets the assembly completion milestone. Should the Russians not meet their revised partnership commitments, the program's cost could increase further by as much as several billions of dollars or more, depending on the severity of Russia's shortfall and the response to that shortfall by NASA and its other international partners. NASA has been monitoring the situation and recently noted that the Russians are experiencing manufacturing problems, which present some risk to the Service Module schedule. However, NASA officials believe that the December 1998 launch date for the Service Module can still be met.

The space station program's financial reserves have dwindled. In June 1997, space station program documents showed that over two-thirds of the \$3 billion in financial reserves included in the program's cost estimate would be used or committed by the end of fiscal year 1997. The reduced reserves and the recent and prospective cost increases have put additional focus on the space station program's administratively imposed funding limitation (cap)—\$2.1 billion annually and \$17.4 billion through the completion of station assembly. NASA has periodically adjusted the program's pace and content to comply with the cap and to replenish the program's financial reserves. However, some of NASA's actions have made the value of the cap as a funding control mechanism questionable. In our September 1997 report, we recommended that use of the current cap be discontinued and suggested that the Congress review the program to determine its future scope and cost level. After that review, if the Congress decides to continue the space station program, it could consider imposing a legislated cap.

Cost and Schedule Performance Continues to Deteriorate

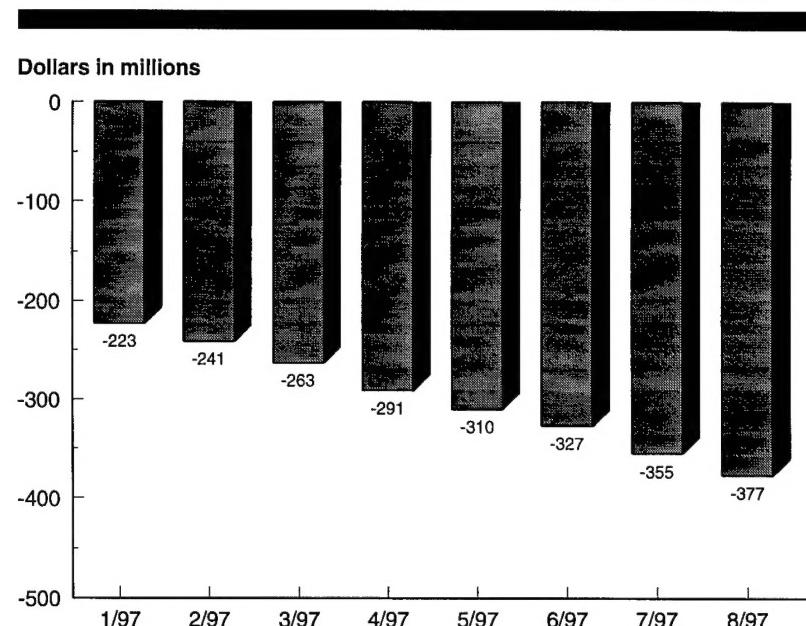
The cost and schedule performance under the prime contract has been consistently worsening for some time. In a June 1997 testimony,⁴ we pointed out that between January 1995 and April 1997, the estimated cost of work to get back on schedule had increased from \$43 million to \$129 million. Since then, the schedule variance⁵ has remained negative, but has worsened only slightly—first rising to \$136 million through June before falling back to \$133 million by the end of August.

Cost growth, however, is a different story. Between January 1995 and April 1997, the variance between the actual cost to complete specific work and the budget for that work had gone from a cost underrun of \$27 million to a cost overrun of \$291 million. Since then, cost growth has significantly worsened. Through July, it stood at \$355 million. August added another \$22 million, bringing the total cost growth to \$377 million. The increased pace of cost growth since early this year is especially worrisome. The average monthly cost growth for the 7-month period ending in August 1997 was \$22 million. This growth rate is more than twice the average monthly rate of about \$10 million for the previous 25 months. Figure 1 illustrates the deteriorating monthly cost growth trend from January 1997 through August 1997.

⁴Space Station: Cost Control Problems Continue to Worsen (GAO/T-NSIAD-97-177, June 18, 1997).

⁵Schedule variances are measured by the estimated dollar value of the difference between the budgeted cost of work planned and work completed.

Figure 1: Cumulative Monthly Cost Growth on the Space Station Prime Contract (January 1997 through August 1997)



Recently, NASA and Boeing updated their estimates of total cost growth at contract completion. During this past summer, after many months of estimating that the total cost growth at the completion of the contract would not exceed \$278 million, Boeing more than doubled its estimate—to \$600 million. Through August 1997, \$377 million in cost growth had already accumulated. Therefore, to keep total cost growth from exceeding \$600 million, Boeing must make up work valued at \$133 million to get back on schedule, as well as slow the average monthly cost growth over the next 6 years to no more than about \$3 million. It would be extremely challenging to achieve both of these results, partly because regaining schedule typically involves increased staffing or overtime work. NASA's estimate of total cost growth at contract completion, which had been generally in accord with Boeing's \$600 million estimate, was recently increased to \$817 million. NASA's higher estimate is based on its assessment of current trends and its belief that Boeing's cost control strategy will not be fully successful.

NASA and Boeing recognize the seriousness of the cost growth situation. NASA did not give Boeing an award fee for the 6-month period ending in March 1997 because of program planning, cost-estimating, and hardware

manufacturing problems. In addition, the recent increase in the estimated cost growth at contract completion has reduced the amount of available incentive fee. On its part, Boeing has implemented a corrective action plan that is intended to improve the performance of the entire contractor team. Boeing's announced strategy includes personnel changes, additional engineers and managers, and the funding of a software integration test facility. Boeing also presented a cost control strategy to NASA that includes organizational streamlining and the transfer of some roles to NASA. The extent to which these efforts will eventually slow the continuing deterioration remains to be seen.

Russia's Delays Increase NASA's Cost

The Russian government's past inability to furnish the Service Module on time has adversely impacted the space station program. According to NASA officials, after more than a year of repeated and unfulfilled promises, Russia has resumed its financial commitment, work has restarted on the Service Module, and significant progress is being made. However, the Service Module delay has increased NASA's cost.

After Russia formally notified NASA about a year ago that its funding difficulties would delay the completion of the Service Module, NASA designed a three-step recovery plan. Step one, which is now underway, focuses on adjusting the station's schedule for an 8-month delay in the availability of the Service Module and developing temporary essential capabilities for the station in case the Service Module is further delayed by up to a year. Major step one activities include delaying the launch of station components that are to precede the Service Module into orbit and building a temporary replacement for the Service Module's propulsion capability. NASA has been monitoring the Russian effort and recently noted that the Service Module is experiencing manufacturing problems that pose some schedule risk. However, NASA officials believe that the Service Module's revised December 1998 launch date can still be met. NASA will complete step one regardless of how the Russians perform.

Step two is NASA's contingency plan for dealing with more delay or the Russian government's failure to ultimately deliver the Service Module. Step two could result in permanently replacing the Service Module's power, control, and habitation capabilities. Under step three, the Russians would no longer be a partner in the International Space Station. Consequently, the United States and its remaining international partners would have to pick up all or most of the financial and operational

responsibilities the Russian government would have had, such as the station resupply mission.

The cost of step one activities is currently estimated at over \$300 million, with almost all of that in fiscal years 1997 through 1999. Additional cost increases related to the station's delayed assembly sequence will be established once NASA resets the assembly completion milestone. NASA's initial cost estimate for step two is \$750 million, but no decision has yet been made to initiate step two. The cost of step three has not been estimated, but just the cost of additional launch services for the station resupply mission would be in the billions of dollars. Consequently, should the Russians not meet their revised partnership commitments, the program's cost could further increase by as much as several billions of dollars or more, depending on the severity of Russia's shortfall and the response to that shortfall by NASA and its other international partners.

Lower Financial Reserves and Increased Costs Focus Attention on Funding Limitations

When NASA redesigned the space station in 1993, the program had approximately \$3 billion in financial reserves.⁶ Since then, the program reserves have been significantly depleted. By June 1997, the program's financial reserves were down to about \$2.2 billion. Overall, more than two-thirds of the reserves were estimated to be used or committed by the end of fiscal year 1997, reducing the remaining uncommitted reserves to less than \$1 billion. Further, with about 6 years remaining until on-orbit assembly of the station is completed, NASA had identified threats in future years that, if realized, would require funding in excess of the remaining uncommitted reserves. Recently, NASA announced additional space station funding requirements totaling \$430 million in fiscal year 1998. Changes in the space station program's estimated funding requirements for fiscal year 1999 and beyond are expected to be available within the next few months.

Reduced reserves and increased cost have put additional focus on the program's funding limitations. For several years, the space station program has been subject to a \$2.1-billion annual and a \$17.4-billion overall funding limitation. These funding limitations, or caps, came out of the 1993 station redesign. Previous redesigns had been largely financially driven and the caps were intended to stabilize the design and ensure that it could be pursued. The caps are not legislatively mandated, although

⁶Since accurately estimating the cost of research and development projects is extremely difficult, NASA's project cost estimates include both a baseline portion to fund known requirements and a financial reserves portion to fund unexpected contingencies, such as schedule delays or changes in projects' objectives or scope.

references to them in congressional proceedings and reports indicate that NASA was expected to build the space station within these limits.

To remain within the cap, NASA has periodically adjusted the program's pace and content. However, some of NASA's actions have made the value of the cap as a funding control mechanism questionable. For example, in establishing the cap, NASA claimed the cost and schedule advantages that it estimated would accompany the inclusion of the Russians in the program as a partner. However, now that Russian participation is having negative cost and schedule effects, NASA is accounting for the additional funds required to implement its Russian recovery plan outside of the portion of the space station program subject to the cap.

In our September 1997 report, we recommended that the use of the current cap be discontinued. We also suggested that the Congress consider taking two actions: (1) review the program's future scope and cost level in conjunction with NASA's fiscal year 1999 budget request and (2) if the Congress decides to continue the program, establish funding limitations that include firm criteria for measuring compliance. To assist in that review, we have been requested by the Chairmen of the Senate Committee on Commerce, Science, and Transportation and its Subcommittee on Science, Technology, and Space, to update our life-cycle cost estimate of the space station program.

Mr. Chairman, this concludes our statement. We will be happy to answer any questions you or the Members of the Subcommittee may have.

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